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| 10/670,189 | 09/26/2003 | Yoichi Sonobe | 01272.000921. | 5411 |

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| EXAMINER |
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GOLDBERG, BRIAN J

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| ART UNIT | PAPER NUMBER |
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2861

DATE MAILED: 02/09/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

| | | | | |
|------------------------------|------------------------|--|---------------------|--|
| Office Action Summary | Application No. | | Applicant(s) | |
| | 10/670,189 | | SONOBE, YOICHI | |
| | Examiner | | Art Unit | |
| | Brian Goldberg | | 2861 | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 15 December 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-16 and 18-24 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 18 and 19 is/are allowed.
- 6) ☒ Claim(s) 1-4, 6-16 and 20-24 is/are rejected.
- 7) ☒ Claim(s) 5 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 22 June 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1-3, 10, 15, 16, and 20-24 are rejected under 35 U.S.C. 102(b) as being anticipated by Ono.

3. Regarding claim 1, Ono discloses “an ink jet printing apparatus (Fig 4) to form an image on a print medium (7 of Fig 4) by ejecting ink onto the print medium from a plurality of nozzles (col 7 ln 57-58) arrayed in a print head (1 of Fig 4), the printing apparatus comprising: a recovery means (6 of Fig 4) to recover a normal ink ejection state of each nozzle in the print head; and recovery operation determining means for dividing the nozzles into a plurality of blocks (1s, 1k, 1c, 1m, 1y of Fig 4), the nozzles divided into the plurality of blocks forming a nozzle array (1 of Fig 1A), counting the number of ejections from the nozzles in each block and, based on the accumulated number of ejections for each block, determining whether or not to execute a recovery operation of said recovery means (col 6 ln 66 – col 7 ln 14).” The nozzles are divided into blocks based on the color of the ink that they eject. Ono states that 1s, 1k, 1c, 1m, and 1y of Fig 4 can be separate heads or divided into sections of nozzles with the nozzles divided into the plurality of blocks forming a nozzle array 1 containing all of the nozzles.

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4. Regarding claim 2, Ono discloses "said recovery operation determining means determines to execute the recovery operation on the print head when at least one of the accumulated numbers of ejections for the individual blocks reaches a predetermined threshold (col 9 ln 36-40)."

5. Regarding claim 3, Ono discloses "the predetermined threshold is a value that differs from one block to another (col 9 ln 24-35)."

6. Regarding claim 10, Ono discloses "an ink jet printing apparatus (Fig 4) comprising: a print head control means (310 of Fig 5) to control a print head having a plurality of nozzles (col 7 ln 57-58) for ejecting ink according to print data; a print head recovery means (6 of Fig 4) to recover a normal ink ejection state of each nozzle in the print head; recovery operation determining means for deciding whether or not to execute a recovery operation of said print head recovery means (col 6 ln 66 – col 7 ln 7); and an accumulated print dot number counter to divide the nozzles of the print head into a plurality of blocks, the nozzles divided into the plurality of blocks forming a nozzle array (1 of Fig 1A), and count the accumulated number of print dots for each block (col 6 ln 66 – col 7 ln 14); wherein said recovery operation determining means determines, based on a value of the accumulated print dot number counter, whether or not to execute the recovery operation of said print head recovery means (col 7 ln 4-7)."

7. Regarding claim 15, Ono discloses "a direction in which the ink is ejected from the nozzles is almost vertical (Figs 3A, 3B, 3C and col 6 ln 17-44)." In these figures and description, the rebound of the ink after being ejected is shown in an upward, almost

vertical direction away from the medium and towards the nozzles. Therefore, the ink must be ejected from the nozzles in an almost vertical direction.

8. Regarding claim 16, Ono discloses "an ink jet printing apparatus...comprising a plurality of print heads (col 4 ln 4-5)."

9. Regarding claim 20, Ono discloses "the print head recovery method comprising: a recovery operation determining step which divides the nozzles into a plurality of blocks (1s, 1k, 1c, 1m, 1y of Fig 4), the nozzles divided into the plurality of blocks forming a nozzle array (1 of Fig 1A), counts the number of ejections from those nozzles making up each block and, when at least one of the accumulated ejection numbers counted for the individual blocks reaches a predetermined threshold, decides to execute a recovery operation (col 6 ln 66 – col 7 ln 14)."

10. Regarding claim 21, Ono discloses "a printing apparatus (Fig 4) to form an image on a print medium (7 of Fig 4) by ejecting ink onto the print medium from a plurality of nozzles (col 7 ln 57-58) arrayed in a print head (1 of Fig 4), the printing apparatus comprising: a print head recovery means (6 of Fig 4) to recover a normal ink ejection state of the print head having the plurality of nozzles for ink ejection; and recovery operation determining means for determining whether or not to execute a recovery operation of said print head recovery means, based on an accumulated number of ejections from predetermined nozzles in the print head, the predetermined nozzles being a portion of the plurality of nozzles forming a nozzle array (col 6 ln 66 – col 7 ln 14)." The recovery operation determination is made for each predetermined portion or block of the plurality of nozzles forming a nozzle array.

11. Regarding claim 22, Ono discloses "means for executing the recovery operation (6 of Fig 4 and col 7 ln 39-45) of said print head recovery means when the accumulated number of ejections reaches a predetermined value (col 7 ln 4-7)."

12. Regarding claim 23, Ono discloses "means for executing the recovery operation (6 of Fig 4 and col 7 ln 39-45) when the accumulated number of ejections from one of the predetermined nozzles reaches a predetermined value (col 7 ln 4-7)."

13. Regarding claim 24, Ono discloses "the predetermined value differs from one of the predetermined nozzles to another (col 9 ln 24-35)."

Claim Rejections - 35 USC § 103

14. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

15. Claims 4, 6, 7, 11-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ono in view of Shimoda.

16. Regarding claim 4, Ono discloses the claimed invention as set forth above with respect to claim 2. Thus, Ono meets the claimed invention except the limitations set forth in claim 4.

17. Shimoda teaches "accumulated ejection number correction means to correct by a weighting value the accumulated number of ejections counted for each block (col 6 ln 30-39), wherein said recovery operation determining means compares the accumulated numbers of ejections corrected by said accumulated ejection number correction means

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with the predetermined threshold (col 5 ln 12-21).” It would have been obvious to one of ordinary skill in the art at the time of the applicant's invention to modify Ono by correcting the accumulated ejection number by a weighting value and comparing the corrected value to a predetermined threshold. One would have been motivated to so modify Ono for the benefit of improving the accuracy of the accumulated numbers of ejections.

18. Regarding claim 6, Ono and Shimoda disclose the claimed invention as set forth above with respect to claim 4. Thus, the Ono and Shimoda combination previously discussed meets the claimed invention except the limitations set forth in claim 6.

19. Shimoda further teaches “the weighting value is changed according to a temperature in the ink jet printing apparatus (col 6 ln 10-15 and Table 1).” It would have been obvious to one of ordinary skill in the art at the time of the applicant's invention to modify the previous Ono and Shimoda combination by altering the weighting value based on a temperature in the ink jet printing apparatus. One would have been motivated to so modify the Ono and Shimoda combination for the benefit of improving the efficiency of the recovery process since the frequency of occurrence of air bubbles in the nozzles changes as the temperature changes, which changes the likelihood of clogging of the nozzles.

20. Regarding claim 7, Ono and Shimoda disclose the claimed invention as set forth above with respect to claim 6. Thus, the Ono and Shimoda combination previously discussed meets the claimed invention except the limitations set forth in claim 7.

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21. Shimoda further teaches "the weighting value is increased as the temperature in the ink jet printing apparatus rises (col 6 ln 26-29)." It would have been obvious to one of ordinary skill in the art at the time of the applicant's invention to modify the previous Ono and Shimoda combination by increasing the weighting value as the temperature rises. One would have been motivated to so modify the Ono and Shimoda combination for the benefit of improving the efficiency of the recovery process since the frequency of occurrence of air bubbles in the nozzles increases as the temperature rises, which increases the likelihood of clogging of the nozzles.

22. Regarding claim 11, Ono discloses the claimed invention as set forth above with respect to claim 10. Thus Ono meets the claimed invention except the limitations set forth in claim 11.

23. Shimoda teaches "weighting means to apply different weights to the values of the different blocks of said accumulated print dot number counter (col 6 ln 30-39), wherein said recovery operation determining means determines, based on a result of the weighting, whether or not to execute the recovery operation (col 5 ln 12-21)." It would have been obvious to one of ordinary skill in the art at the time of the applicant's invention to modify Ono by correcting the accumulated ejection number by a weighting value and determining whether or not to execute the recovery operation based on the weighted value. One would have been motivated to so modify Ono for the benefit of improving the accuracy of the accumulated numbers of ejections.

24. Regarding claim 12, Ono in view of Shimoda discloses the claimed invention as set forth above with respect to claim 11. Thus Ono in view of Shimoda meets the claimed invention except the limitations set forth in claim 12.

25. Shimoda further teaches "the weight applied by said weighting means is based on a structure of a liquid chamber in the print head (col 7 ln 9-14)." It would have been obvious to one of ordinary skill in the art at the time of the applicant's invention to modify Ono by weighting the accumulated ejection number "based on a structure of a liquid chamber in the print head." One would have been motivated to so modify Ono for the benefit of improving the efficiency of the recovery process since the likelihood of the nozzles getting clogged after a certain number of ejections is different for different structures.

26. Regarding claim 13, Ono discloses "print head recovery means (6 of Fig 4) to recover a normal ink ejection state of each nozzle in the print head; recovery operation determining means for determining whether or not to execute a recovery operation of said print head recovery means (col 9 ln 18-23); and an accumulated print dot number counter to divide the nozzles of the print head into a plurality of blocks (1s, 1k, 1c, 1m, 1y of Fig 4), the nozzles divided into the plurality of blocks forming a nozzle array (1 of Fig 1A), and count the accumulated number of print dots for each block (col 9 ln 14-16), wherein said recovery operation determining means determines, based on a value of said accumulated print dot number counter, whether or not to execute the recovery operation (col 15 ln 25-30)." Thus Ono meets the claimed invention except "an ink jet printing apparatus to form an image on a print medium by using a print head, wherein

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the print head includes a plurality of nozzles for ejecting ink, an ink supply port to receive a supply of ink, a liquid chamber to deliver the supplied ink to the nozzles, and a plurality of nozzle heaters provided one in each nozzle to heat the ink and thereby form a bubble in ink in each nozzle to eject the ink by a pressure of the expanding bubble.”

27. Shimoda teaches “an ink jet printing apparatus (IJRA of Fig 1) to form an image on a print medium (P of Fig 1) by using a print head (IJC of Fig 1), wherein the print head includes a plurality of nozzles for ejecting ink (col 4 ln 22-24), an ink supply port to receive a supply of ink, a liquid chamber to deliver the supplied ink to the nozzles, and a plurality of nozzle heaters provided one in each nozzle to heat the ink and thereby form a bubble in ink in each nozzle to eject the ink by a pressure of the expanding bubble (col 8 ln 38-41, col 8 ln 17-29, and col 4 ln 34-41).” It would have been obvious to one of ordinary skill in the art at the time of the applicant's invention to modify Ono by providing an ink jet apparatus using a print head as described in claim 13. One would have been motivated to so modify Ono for the benefit of providing an ink jet printer with the capability of performing a recovery operation and determining when such a recovery operation is necessary.

28. Claims 8 and 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ono in view of Gast et al.

29. Regarding claim 8, Ono discloses the claimed invention as set forth above with respect to claim 1. Thus Ono meets the claimed invention except “the recovery operation includes an operation of moving ink in the print head.”

30. Gast et al. teach "the recovery operation includes an operation of moving ink in the print head (col 5 ln 5-6)." Gast et al. state servicing includes spitting all nozzles, which requires the movement of ink in the print head. It would have been obvious to one of ordinary skill in the art at the time of the applicant's invention to include moving ink in the print head as part of the recovery operation. One would have been motivated to so modify Ono for the benefit of providing an improved means of cleaning the print head.

31. Regarding claim 9, Ono and Gast et al. disclose the claimed invention as set forth above with respect to claim 8. Thus the Ono and Gast et al. combination previously discussed meets the claimed invention except the limitations set forth in claim 9.

32. Gast et al. further teaches "the recovery operation includes a preliminary ejection for ejecting ink not involved in a printing operation from each nozzle (col 5 ln 5-6)." Gast et al. state servicing includes spitting all nozzles, which is defined as ejecting ink from each nozzle not involved in a printing operation.

Allowable Subject Matter

33. Claim 5 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

34. Claims 18 and 19 are allowed.

35. The following is a statement of reasons for the indication of allowable subject matter:

36. Regarding claim 18, the prior art does not disclose or suggest the claimed “target print dot number, on which is based a decision to execute the recovery operation, is set large for nozzles near an ink supply port” in combination with the remaining claim elements set forth in claim 18.

37. Regarding claim 19, the prior art does not disclose or suggest the claimed “target print dot number, on which is based a decision to execute the recovery operation, is set large for a central portion of the print head and small for end portions of the print head” in combination with the remaining claim elements set forth in claim 19.

Response to Arguments

38. Applicant's arguments filed 12/15/05 have been fully considered but they are not persuasive. Ono does disclose dividing the nozzles into a plurality of blocks (1s, 1k, 1c, 1m, 1y of Fig 4) with the nozzles divided into the plurality of blocks forming a nozzle array (1 of Fig 1A). The nozzles are divided into blocks based on the color of the ink that they eject. Ono states that 1s, 1k, 1c, 1m, and 1y of Fig 4 can be separate heads or divided into sections of nozzles with the nozzles divided into the plurality of blocks forming a nozzle array 1 containing all of the nozzles. Also, Ono does disclose that determining whether or not to execute a recovery operation is based on an accumulated number of ejections from predetermined nozzles in a printhead, with the predetermined nozzles being a portion of the plurality of nozzles forming a nozzle array (col 6 ln 66 – col 7 ln 14). The recovery operation determination is made for each predetermined portion or block of the plurality of nozzles forming a nozzle array.

Conclusion

39. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Brian Goldberg whose telephone number is 571-272-2728. The examiner can normally be reached on Monday through Friday, 9AM-5PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Talbott can be reached on 571-272-1934. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



BJG

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February 3, 2006